

# **Energy Conservation**

**Activity 9: Save or Waste?**

**Activity 10: New Old Paper**

**Activity 11: The Best Color**

Activity 9 **SAVE OR WASTE?** (This can also be used as a task assessment.)

**CONCEPT** Energy can be conserved in various ways.

**GOAL** Students will list some ways to save energy. They will also identify activities that waste energy and practices that save (conserve) energy. Recycling is another way to save energy.

**MATERIALS** Items listed in bold type must be supplied by the teacher. "Save or Waste?" cut-up strips (CUT STRIPS AHEAD OF TIME), "Should You Shower or Bathe?" worksheet, **scissors, poster paper, markers.**

**ACTIVITY**

INVITE

1. Tell students there are many things we can do at home to stop wasting energy. Examples: it wastes energy to leave lights on in an empty room; it saves energy to turn off lights before leaving a room. Students can discuss other examples of conservation and wasting.

DISCOVER

2. Scramble up the energy-related behavior statements.

3. Distribute the statements among your students. Challenge the students with "wasting behavior" strips to match with the students who have the "saving behavior" strips, and visa versa.

4. Once students have found partners with the correct strips, have each pair read their strips to the rest of the class.

ANALYZE DATA

5. Be sure students understand how each corrective measure saves energy. Ask students what would happen if we didn't try to save energy. Lead them to understand that conservation extends energy resources, saves money, and protects the environment. These measures are particularly important until scientists and engineers can have renewable energy sources available on the scale to meet consumer needs.

TAKE ACTION

6. Have students complete "Should You Shower or Bathe?" at home. As you hand it out, be sure to have them make predictions before taking it home.

7. Have students report their findings to the class and keep a record on the board of which saved more water. Point out that not only can we conserve energy by heating smaller amounts of water, you are also saving a renewable resource - water.

8. Discuss one way to heat water--solar energy. What are the advantages? Disadvantages?

9. Create a class poster illustrating examples of saving/wasting energy. Glue or tape onto construction paper and hang in the room. Students can add to it as you continue with the unit.

**SAVE OR WASTE?**

SAVE	WASTE
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# Save or Waste?

**It saves energy when you...**

**It wastes energy when you...**

Use a pan the size of the burner on the stove.	Put a little pan on a big burner on the stove.
Cook many items in oven at the same time.	Cook only one item in oven.
Put lid on pan when cooking. It keeps heat in.	Leave lid off pan when cooking.
Keep oven door closed. Use a clock to tell when food is ready	Peek in oven while food is cooking.
Toast bread in toaster, not in oven.	Toast bread in oven, rather than in a toaster.
Stop cooking when food is tender.	Cook food longer than needed.
Run the washing machine with a full load.	Run the washing machine without many clothes in it.
Wash clothes in cold water when possible.	Wash clothes with more hot water than needed.
Take a shower, instead of a bath.	Fill bath tub to the top.
Wash and rinse dishes in two pans.	Wash dishes under a running faucet.
Fix the leaking faucet.	Have a leaking faucet.
Iron clothes all at the same time.	Iron clothes one or two items at a time.
Turn off TV or radio when nobody is watching or listening.	The TV or radio plays to an empty room.
Turn off lights that you don't need.	Lights are on in empty room.
Close the curtains in the room you're cooling.	The sun shines into the room you're trying to cool.

Open and close the refrigerator door quickly.	Keep the refrigerator door open longer than needed.
When it is cold, wear warm clothes in several layers.	When it is cold, wear thin clothes.
When it is cold, close outside doors quickly.	When it is cold, leave outside doors open longer than needed.
Stuff rags, paper or rug in crack under outside door.	Have a crack under the outside door.
Have good insulation in outside walls and roof.	Have poor insulation in outside walls and roof.
Combine errands so that only one trip in the car is needed.	Take many trips in the car.

Name\_\_\_\_\_

## **Should You Shower or Bathe?**

Remember: It takes energy to heat the water in your bath or shower.

**Purpose:** When do you use more water: showering or bathing?

**Prediction:**

\_\_\_\_\_

**Procedure:**

1. Take a bath. Fill your tub with water as usual. Before you step into the tub, measure the depth of the water with a ruler. The depth of the bath water is \_\_\_\_\_ inches.
2. Take a shower (on another day). Before you begin, close the bathtub drain so the shower water will collect in the tub. When you have finished with your shower, measure the depth of the water that has collected. The depth of the shower water is \_\_\_\_\_ inches.

**Results:**

3. What is the difference in inches in the amount of water you used?  
\_\_\_\_\_ inches

**Conclusion:**

If people took \_\_\_\_\_ instead of \_\_\_\_\_  
a lot of energy would be saved.

It's not only good sense to save energy, but you are also saving another renewable resource--water.

## Activity 10 **NEW OLD PAPER**

**CONCEPT** Newspapers can be recycled and can save energy.

**GOAL** Students will learn recycling and conservation techniques by reusing paper as another way of conserving resources.

**MATERIALS** Items listed in bold type must be supplied by the teacher. Office paper--about 100 sheets, 2-gallon buckets or pans per group, embroidery screens, magnifying glass, **blender, water, diapers, sponge, "Recycling Newspaper" diagram.**

**ACTIVITY (Note: This is a two-day activity.)**

### INVITE

Day One

1. Discuss with students where paper comes from. Discuss the cutting down of trees, transport to lumber mills, transport to the pulp mill, transport to the paper mill, and then to the people who are going to use it.
2. Discuss ways to conserve trees and energy, i.e., using the front and back of pieces of paper.
3. Making new paper from old paper uses half the amount of energy as making new paper from trees. It also saves trees. Saving trees helps clean up industrial pollution since trees absorb carbon from the atmosphere--not to mention all the animals' homes provided by trees and how nice they are to look at!

### CREATE/APPLY NEW KNOWLEDGE

4. Divide students into groups of 3 or 4. Give them a some old office paper. Tell them to shred the paper into quarter-sized pieces.
5. Fill the blender 3/4 full of water. Add a handful of shredded paper and blend. Repeat, adding handfuls at a time until the mixture resembles oatmeal. (If you wish to let each child make his/her own piece of paper, use smaller amounts.) This mixture is called **pulp**.
6. Fill the buckets or pans (or a janitor's sink) with water.
7. Have a student take an embroidery screen and set it in the pan of water.
8. Pour the pulp from the blender into the pan so that it is on top of the screen.
9. Tell the student to carefully pull the screen upward making sure the screen stays parallel to the bottom of the pan. As the screen is pulled up, the pulp will stick to it. Pull it straight out of the water and let it drain.
10. Place the screen upside-down on a diaper. Use a damp sponge on the back of the screen to loosen the pulp from the screen and to push it onto the diaper. Carefully loosen and remove the embroidery screen and let the paper dry on the diaper. Give the screen to the next member of the group.

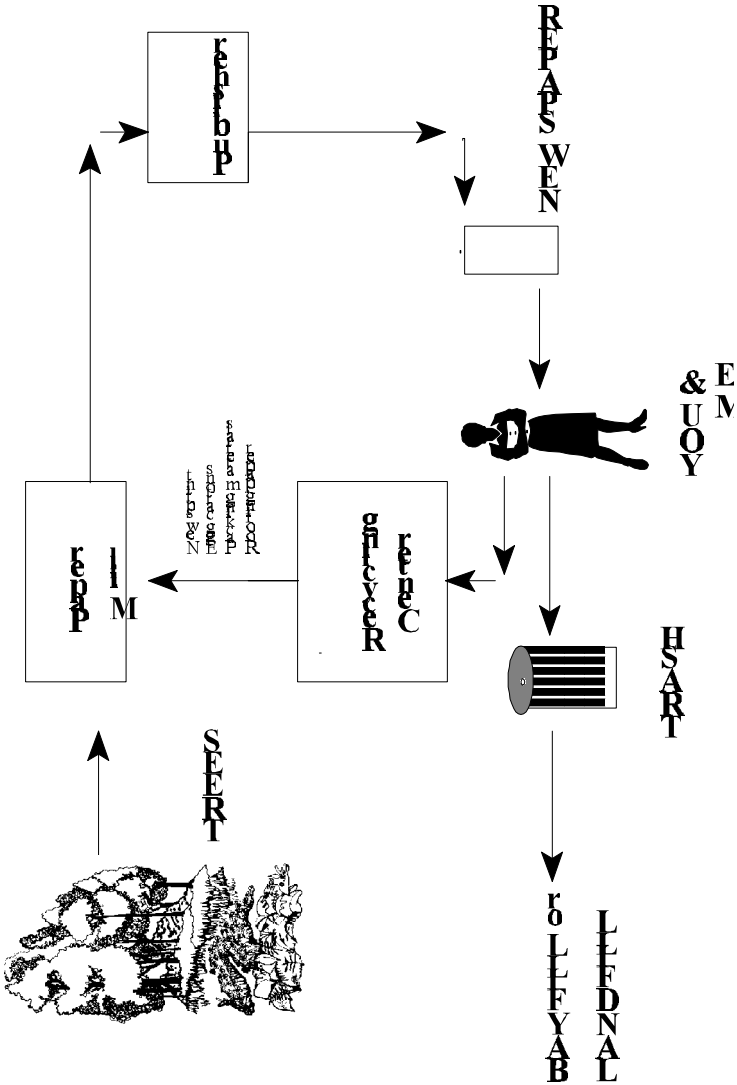
## Day Two

11. Once the paper has dried, have each student carefully remove it from the diaper. Re-use the diapers! Students can write an advantage to recycling paper on this sheet. What are some disadvantages to this paper?

### TAKE ACTION

1. Hand out "Recycling Newspaper." Review the origins of paper and discuss logging practices.
2. Where does paper go if we don't reuse it? [To the landfill, which is costly. Also, space for landfills is becoming scarce.]
3. What happens if we all take our paper to the recycling center, but no one buys recycled paper products?
4. Talk about some of the problems of cutting down too many trees (e.g., increase global warming, loss of habitat, loss of scenic beauty).
5. Make an "accordion book" illustrating the steps on "Recycling Newspaper." [An accordion book is made of square pieces of paper cut or folded with the right hand sides attached so that the sequence of recycling paper can read from left to right. The book is folded alternately along the right-hand side, leaving the first square (page) on top.]

# Recycling Newspaper





## Activity 11 **THE BEST COLOR**

**CONCEPT** There are many ways to conserve energy.

**GOAL** Students will explain that color can affect the absorption of heat energy.

**MATERIALS** Items listed in bold type must be supplied by the teacher. Ask students to bring in a clean soup can with the label removed and the top cut out. (You'll need one can per pair of students.)

Flat enamel paints, thermometers, plastic wrap, rubber bands, Data Collection sheets, transparency of thermometers, transparency of Class Data Sheet.

### **ACTIVITY**

#### INVITE

1. Discuss how color can be "hot" or "cold." What color of t-shirt would you wear on a hot day to stay cool?
2. Tell students they will be conducting an experiment to see which colors absorb the most heat energy. Students will need to work in pairs. Students choose one color to paint their soup can. Distribute paints, brushes, cans of water. (If students have difficulty with the term "absorb," use a sponge absorbing water as an example.)

#### EXPLORE, DISCOVER

3. Give each group a Data Collection Sheet.
4. Reteach/review how to read a thermometer. Use the transparency and explain that measuring temperature in Celsius (right hand side) or Fahrenheit (left hand side) will require they count by 2's. Have them turn to the second page of their Data Collection Sheet and explain how to mark the beginning and ending temperatures when they do the lab.
5. Put a thermometer in each empty can. Have them predict the final temperature for their color. Then place the cans in a sunny area with no drafts. Record the temperature every minute for 8 minutes.

#### ANALYZE DATA, PROPOSE EXPLANATIONS

6. Students record 1-minute and final temperatures, then complete the questions on page 2. The teacher records their results on the Class Data Sheet transparency. Students copy this data on page 3. Sequence the colors and their temperatures from lowest to highest.
7. Have students answer questions on the fourth page. Discuss the impact of color on heating. Where are there patterns? For example, did the dark colors result in higher temperatures? What effect did light colors have on temperatures? Have students classify colors into groups of high temperature and low.

#### PRESENT FINDINGS, GENERATE IDEAS FOR FURTHER INVESTIGATION

8. Repeat the same experiment but fasten plastic wrap tightly across the top of the can. Cut a small slit for the thermometer. Record temperatures for 8 minutes.
9. Discuss the "Greenhouse Effect" as a process where the Earth's atmosphere traps heat on the Earth's surface. The plastic cover represents air and clouds and increasing amounts of carbon dioxide. Carbon dioxide is a by-product of combustion, which is the process of burning fossil fuels. This is another reason

for pursuing renewable energy technologies as an alternative to fossil fuels since the greenhouse gases are increasing globally.

10. Experiment with different kinds of insulation. Use three cans and insulate one can with felt, one with aluminum foil, and place another can in a slightly larger glass jar. Repeat the activity above.

11. Test the inside of teachers' cars and see which colors make the inside hottest.

12. Place ice cubes on teachers' cars and see which colors cause the ice cubes to melt fastest.

13. Ask students the color of concrete [white or light colored]; asphalt [black]. Give them the following situation: their parents are getting ready to put in a driveway that will come up next to the side of the house that faces south. There are lots of windows facing south. Which kind of driveway should their parents put in--concrete or asphalt? Ask about the temperature inside the house on a hot summer day. Have students draw a conclusion about color and absorption of heat.

Name \_\_\_\_\_  
Date \_\_\_\_\_

## Data Collection Sheet

COLOR OF CAN: \_\_\_\_\_

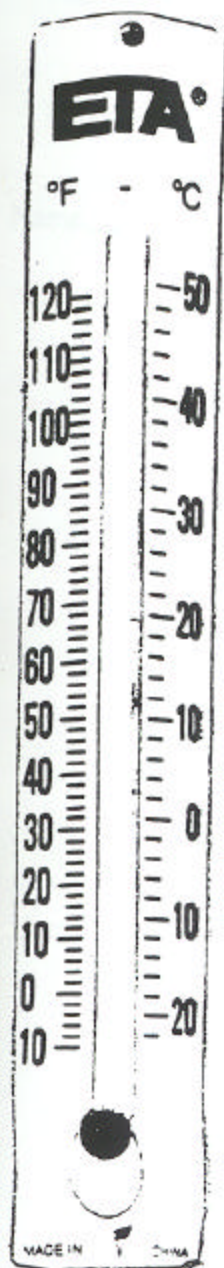
I predict that the temperature in the can will \_\_\_\_\_

\_\_\_\_\_.

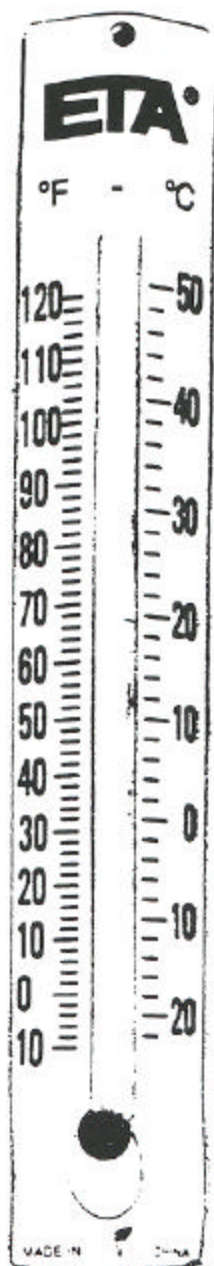
I predict that different colored cans will \_\_\_\_\_

\_\_\_\_\_.

Time	F	C
Start		
1 min.		
2 min.		
3 min.		
4 min.		
5 min.		
6 min.		
7 min.		
8 min.		



1 min.



8 min.

Getting Energized - 3-6

Color of Can

What happened with the temperature in my \_\_\_\_\_ can?  
(color)

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What happened with the temperature in my can compared to the temperature in different colored cans?

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Name\_\_\_\_\_

## Class Data Sheet

<u>Color</u>	<u>High Temperature</u>
White	
Red	
Yellow	
Blue	
Black	
Purple	
Orange	
Brown	
Green	
Turquoise	
Unpainted	

Sequence the colors and their temperatures from lowest to highest.

Name\_\_\_\_\_

## **The Best Color**

1. Which colors would be best for painting homes, schools, and other buildings to keep them warm in winter? Why?

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2. Which color clothes would be warmer in the winter? Why?

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3. Which color clothes would be cooler in the summer? Why?

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4. How can choosing the best color save energy?

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5. “The color of paint can affect the absorption of heat energy.” Tell what this means in your own words, or explain how you know this is true.

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